



Notes on West African *Perrona* (Gastropoda: Clavatulidae), with the description of a new species

Notas sobre *Perrona* (Gastropoda: Clavatulidae) en Africa Occidental, con la descripción de una nueva especie

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ABSTRACT

The type species of the genus *Perrona* is poorly known and given an erroneous type locality. One of the purposes of this paper is to clarify its status and correct spelling as well as illustrating the species and defining its distribution area. A new species from Angola belonging to this genus is described. The shell, protoconch, operculum and radula are illustrated, and the reasons for assigning this new species to this genus are discussed. All known species of *Perrona* are figured.

RESUMEN

La especie tipo del género *Perrona* es poco conocida y la localidad tipo dada es errónea. El objetivo de este trabajo es clarificar su situación, su correcto nombre, además de representar la especie y clarificar su área de distribución. Se describe una nueva especie de este género de Angola. Se muestran concha, protoconcha, opérculo y rádula de la nueva especie y se discuten las razones para asignarla a este género y no a otros con similar morfología. Se ilustran todas las especies conocidas de este género.

KEY WORDS: Clavatulidae, *Perrona*, West Africa, Angola, new species.

PALABRAS CLAVE: Clavatulidae, *Perrona*, África occidental, Angola, nueva especie.

INTRODUCTION

Classical malacological works like BRUGUIÈRE (1792), LAMARCK (1801, 1816 and 1822), KIENER (1840) and REEVE (1843, 1845) and publications dealing with Turridae (s.l.) such as RÉCLUZ (1851), PETIT DE LA SAUSSAYE (1851), VON MALTZAN (1883, 1884), SYKES (1905), DAUTZENBERG (1912), STREBEL (1912, 1914) have described numerous West African species assigned to the family Clavatulidae Gray, 1853.

Their generic placements and synonymies are still not clear. Some modern works like KNUDSEN (1952, 1956), ARDOVINI (2004), BOYER AND HERNANDEZ (2004), NOLF (2006), NOLF AND VERSTRAETEN (2006) and BOYER AND RYALL (2006) have described new species or revised others, placing most of them in the genus *Clavatula*.

Among our material from Angola, dredged over many years by Xico Fer-

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nandes, a new small unidentified species was found. Its description is one of the subjects of this work. The generic attribution to the genus *Perrona* (Schumacher, 1817) requires a review of the type species because it is a rather poorly known species. This paper therefore also comments on the type species.

The identity of *Perrona perron*

MARTINI AND CHEMNITZ (1788: 278, pl. 164, figs. 1573, 1574) illustrated a shell they named "*Der Perron*". Later GMELIN (1791), referring to Chemnitz's figures, described it as *Murex perron* and indicated "in Oceano australi" as its geographic origin. This type locality is obviously wrong. These figures, or the shell they represent, can be considered to be the lectotype. Its present whereabouts, as noted below, are unknown.

When LAMARCK (1816) described *Pleurotoma spirata* he also made reference to the same illustrations, but separated his species from them by stating "*La figure citée de Chemnitz offre sur la base du dernier tour, des sillons dont notre coquille est absolument dépourvue*".

SCHUMACHER (1817) also referred to the same illustrations of Chemnitz when he described the genus *Perrona* and nominated *Perrona tritonium* as the type of this genus. *P. tritonium* is therefore a junior objective synonym of *Perrona perron* (Gmelin). Again no locality was given.

The species was subsequently described for a third time by REEVE (1843) who referred once more to Chemnitz's illustrations. He gave it the name *Pleurotoma perronii*, drawing his own figure from his own shell. He likewise did not state a locality or habitat. Reeve cited Lamarck's *spirata* as a different species, writing "*I have a shell before me of very different character (Pleurotoma Perronii, nobis), answering exactly to the figure in question*". REEVE (1843) did not cite Gmelin and therefore appeared to consider his name as a valid new species. However it is clearly a junior synonym of Gmelin's species and it is concluded that this was an omission in Reeve's work.

MARRAT (1877) was the first to give an indication of the true range of the

species when he included it in a list of North-west African shells which he stated came "from Madeira to the Gulf of Guinea".

TRYON (1884), although stating his opinion that this species was an intermediate form between *lineata* and *spirata*, mentioned it as *Clavatula* (subgenus *Perrona*) *perron* Chemnitz and provided a detailed description.

STREBEL (1912), in his revision of genus *Perrona*, treated as clearly different species both *spirata* and *perron*. He was able to examine Chemnitz's specimens from which the famous drawings were made and reillustrated it. He referred immature specimens of the species to Reeve's description, calling them *perron* var. *reevei*. He also correctly indicated part of the correct habitat range of the species, citing specimens he had examined from Pointe Noire, Congo to Ambriz, northern Angola.

KNUDSEN (1952) employed the name "*Clavatula perronii* (Reeve)" noting that the "Atlantide expedition" could not obtain any additional material and that Chemnitz's type could no longer be traced at the ZMUC.

POWELL (1966), who referred correctly to the type species of *Perrona*, did not figure *Perrona perron* but illustrated *Perrona spirata* (Lamarck, 1816).

More recently, CERNOHORSKY (1974) figured a syntype from Chemnitz (in ZMUC), commenting that "*the species most probably lives in West Africa but this locality has been not substantiated by either literature records or authentic specimens. Another possibility is that Murex perron is conspecific with Pleurotoma spirata Lamarck, 1816, as suggested by NORDSIECK (1968: 154) although the two species appear quite distinct*".

Finally, BERNARD (1984, fig. 182) figured under the erroneous name "*Clavatula kraepelini*" three specimens of this species. He unknowingly extended Strebel's habitat range northwards, quoting the localities of both Cape Esterias and Mayumba in Gabon, and indicating a depth of -20 to -50 meters.

After examining Reeve's type specimens, the available literature and some

shells in the collection of one of the authors (PR), it was decided to record some additional information about this poorly known group.

Abbreviations:

AMNH American Museum of Natural History, New York
ANSP Academy of Natural Sciences, Philadelphia
BMNH The Natural History Museum, London
MCZ Museum of Comparative Zoology, Harvard university

MHNS Museo de Historia Natural "Luis Iglesias" Universidad, Santiago de Compostela
MNCN Museo Nacional de Ciencias Naturales, Madrid
MNHN Muséum national d'Histoire naturelle, Paris
ZMUC Zoologisk Museum, Copenhagen
USNM National Museum of Natural History, Washington
ZSM Zoologisches Staatmuenchen Museum, Muenchen
CJH collection of Juan Horro, Vigo
CPR collection of Peter Ryall, Maria Rain

SYSTEMATIC PART

Family CLAVATULIDAE Gray, 1853
Genus *Perrona* Schumacher, 1817

Type species: *Perrona tritonium* Schumacher, 1817 = *Murex perron* Gmelin, 1791 = *Pleurotoma perronii* Reeve, 1843.

Perrona perron (Gmelin, 1791) (Figs. 1-13)

Der Perron Martini and Chemnitz, 1788: 278, pl. 164. figs. 1573, 1574 (Fig. 1).

Murex perron Gmelin, 1791: 3559.

Perrona tritonium Schumacher, 1817: 218.

Pleurotoma perronii Reeve, 1843: pl. 11, sp. 94 (Fig. 2).

Type material: Figured syntype of *Der Perron*, whereabouts presently unknown; this specimen is reported as examined by STREBEL (1912) but could not be traced by KNUDSEN (1952) who nevertheless mentions another shell labelled in the handwriting of Chemnitz. *Pleurotoma perronii*: holotype BMNH 1900.2.8.26.

Other material examined: 8 shells (Figs. 4-10), Pointe Noire, Congo (CPR).

Type locality: Erroneous for *Der Perron* (in Oceano australi). Not mentioned in the original description of any of the other taxa. Here designated at Pointe Noire, Congo.

Description: Shell (Figs. 3-12) see the original descriptions as well as TRYON (1884) and STREBEL (1912). The following data can be added: the protoconch (Fig. 13) consists of about 2 1/2 shiny, smooth whorls, honey brown in colour; the first whorl slightly darker and of 750 µm diameter. From the protoconch whorls a series of opisthocline axial ribs start to form, first as thin riblets extending from the top to the bottom of the whorl, becoming stronger and shaped as an inverted C in the second teleoconch whorl where their bases become

more globose. Between them small striae can be seen. In the subsequent whorl they detach themselves entirely from the upper subsutural cord which also increases in prominence. In the fourth teleoconch whorl these vestiges of the axial ribs become closer and closer to the lower suture, declining in prominence until they entirely disappear. The following whorls are smooth with an irregular, raised subsutural collar and the whorls are traversed by s-shaped striae. At the same time as the axial riblets form in the third whorl,

about 9 radial striae also start to emerge becoming slightly stronger in the following whorls but then decreasing in intensity in the fourth or fifth whorls and thereafter are hardly noticeable.

The shell is a light honey-brown throughout. On the fourth whorl the subsutural colar starts to become lighter, being entirely white in the fifth whorl. In subsequent whorls it can be interrupted by patches of light brown; in the final whorl the two major cords are white interspaced with small brown patches the same colour as the whorl itself and the cords on the columnella are also white.

Size: the shell can reach up to 37.2 mm (BERNARD, 1984).

Remarks: The comparison of juvenile specimens of *P. perron* with species of the genus *Clavatula* (type species: *Clavatula coronata* Lamarck, 1801) show much similarity in the aspect of the opisthoclinal axial ribs, which tend to disappear with maturity in the subsequent whorls. For this reason it is concluded that there is a stronger relationship between these two genera, than with other genera within this family.

Whilst some authors synonymized *P. perron* with *P. spirata* Lamarck, 1816 it must be noted that not only are they morphologically different, but the latter inhabits an area further to the south, being restricted to the Luanda area where it has been found at -5/50 meters.

Distribution: This species inhabits the West African infralittoral coast from Cap Esterias (Gabon) to Ambriz (northern Angola).

Special remarks: The type locality is always related with a holotype or a lectotype. In the present case, the original figures are sufficient to determine the identity of the species and it is not necessary to designate a neotype; *Pleurotoma perronii* was described lacking type locality as confirmed by the label of this holotype in BMNH. If the type locality of the first description is erroneous, and no other is mentioned in the description of the synonymized taxa, it is necessary to give more detailed information. Pointe Noire (Congo) is designated as the type locality being in the center of the known distribution area, as well as a locality mentioned by STREBEL (1912) and the source of our specimens. Our material agrees very well with the figures and the known holotype.

Concerning the correct spelling for the name of this species, it must be *perron*, which is the first name employed by GMELIN (1791) and which is apparently a name not dedicated to a person. TRYON (1884) stated that Chemnitz employed the common Dutch name "*perron*" (= flight of stairs, in reference to the profile) and that REEVE (1843), misinterpreting Chemnitz's name to be a personal name, Latinized it to read "*perronii*".

Perrona micro spec. nov. (Figs. 14-19, 21, 23, 24-28)

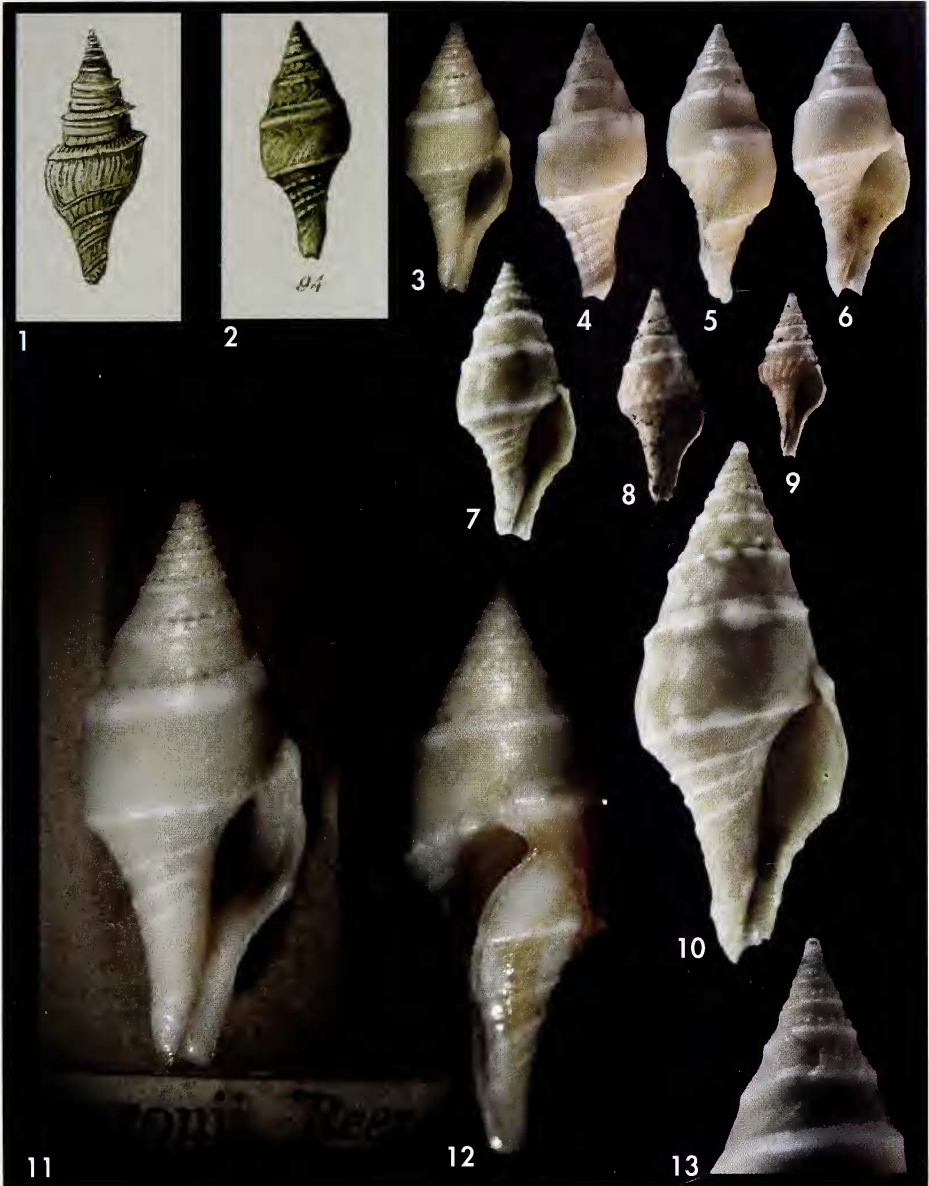
Material examined: Holotype (Figs. 14, 15), in MNCN (15.05/47050). Paratypes in the following collections: MNHN (1, Fig. 16); BMNH (1, Fig. 17); AMNH (1); USNM (1); ZSM (1); ANSP (1); MCZ (1); CPR (11); CJH (6); MHNS (16, Fig. 18).

Type locality: Palmeirinhas, south of Luanda, Angola, between 3 and 20 meters depth.

Etymology: The specific name refers to the small size of the species.

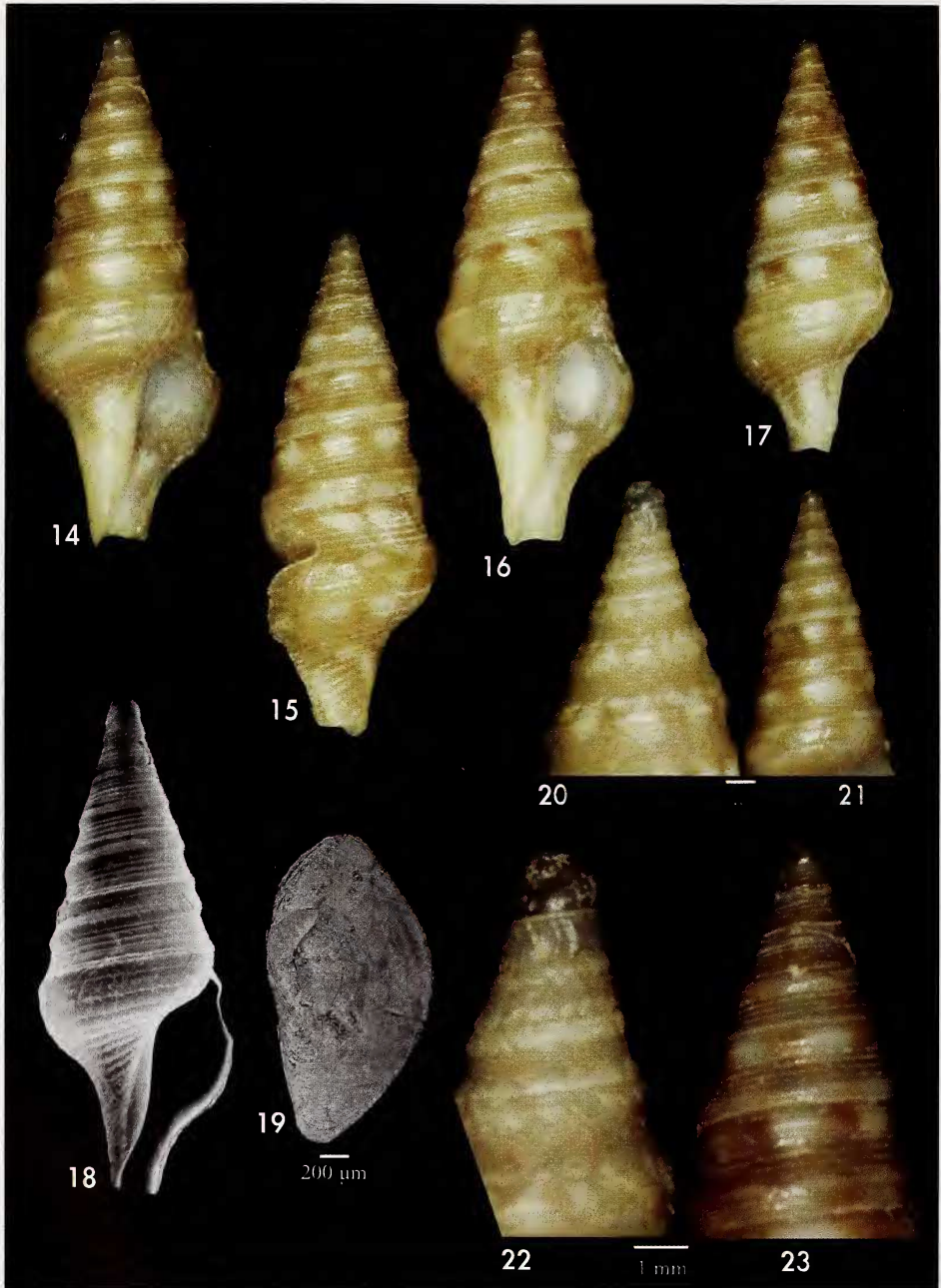
Description: Shell (Figs. 14-18) small for the genus, very solid, lanceolate. Protoconch (Figs. 21, 23, 24-26) with a little more than one whorl, of 530 µm in diameter and white in colour. The teleoconch begins with three grooves that separate 4 cords, later increasing to four and then five spiral grooves; there are

six in the subsequent whorl; the two cords immediately below the suture as well as the lowest cord are more prominent. This gives the middle part of the whorl a concave appearance whilst the upper and lower parts protrude before their separation at the suture. There is no axial sculpture except for growth

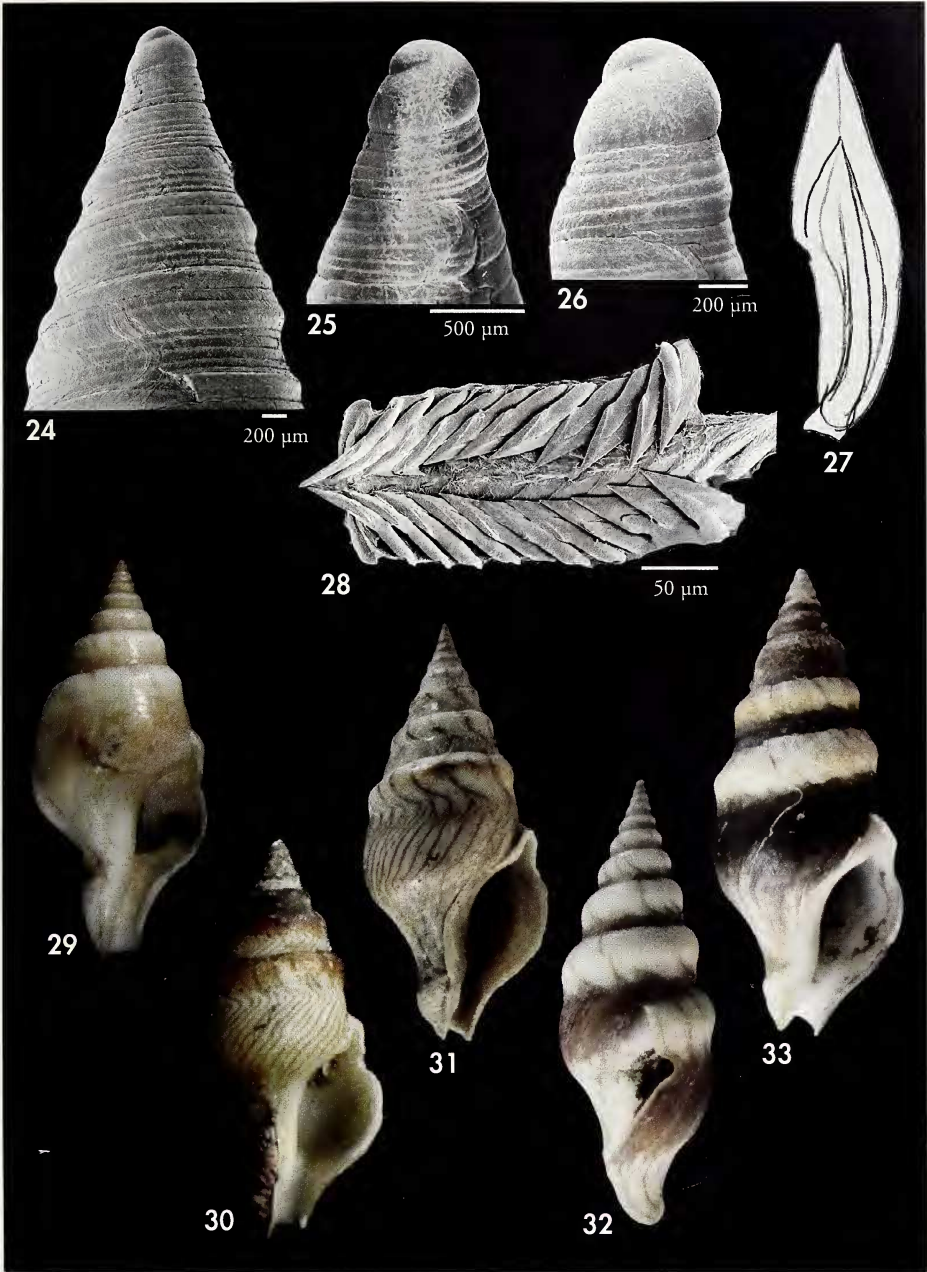


Figures 1-13. *Perrona perron*. 1: figure from MARTINI AND CHEMNITZ (1788); 2: figure of the holotype of *Pleurotoma perronii* from REEVE (1843); 3: holotype (see below Figs. 11, 12) of *Pleurotoma perronii* (BMNH) at the same comparative size; 4-6: shell (27.6 mm), Pointe Noire, Congo (CPR); 7: shell, 28.6 mm, Pointe Noire (CPR); 8, 9: juveniles, 18.6 and 14.2 mm, Pointe Noire (CPR); 10: shell, 27.2 mm, Pointe Noire (CPR); 11, 12: holotype of *P. perronii*, 25 mm (BMNH); 13: spire and protoconch, Pointe Noire (CPR).

Figuras 1-13. Perrona perron. 1: *figura de MARTINI Y CHEMNITZ (1788)*; 2: *figura del holotipo de Pleurotoma perronii, de REEVE (1843)*; 3: *holotipo (véase abajo Figs. 11, 12) de Pleurotoma perronii (BMNH) con el mismo tamaño relativo*; 4-6: *concha, 27,6 mm, Pointe Noire, Congo (CPR)*; 7: *concha, 28,6 mm, Pointe Noire (CPR)*; 8, 9: *juveniles, 18,6 y 14,2 mm, Pointe Noire (CPR)*; 10: *concha, 27,2 mm, Pointe Noire (CPR)*; 11, 12: *holotipo de P. perronii, 25 mm (BMNH)*; 13: *spire and protoconch, Pointe Noire (CPR)*.



Figures 14-19. *Perrona micro* spec. nov. 14, 15: holotype, 10.3 mm (MNCN); 16: paratype, 10.6 mm (MNHN); 17: paratype, 8.5 mm (BMNH); 18: paratype, 7.6 mm (scanning electron microscope) (MHNS); 19: operculum (SEM). Figures 20-23. Comparison of the spire and protoconch of *Clavatula quinteni* (Figs. 20, 22) and *Perrona micro* (Figs. 21, 23).
 Figuras 14-19. *Perrona micro* spec. nov. 14, 15: holotipo, 10,3 mm (MNCN); 16: paratipo, 10,6 mm (MNHN); 17: paratipo, 8,5 mm (BMNH); 18: paratipo, 7,6 mm (microscopio electrónico de barrido) (MHNS); 19: opérculo (MEB). Figuras 20-23. Comparación de la espira y protoconcha de *Clavatula quinteni* (Figs. 20, 22) y *Perrona micro* (Figs. 21, 23).



Figures 24-27. *Perrona micro*. 24: detail of the spire; 25, 26: detail of the protoconch; 27: radular tooth; 28: radula. Figures 29-33. *Perrona obesa*. 29: holotype, 34.0 mm (BMNH); 30: shell, 31.2 mm, 10 m, Namibe, Angola (CER); 31: shell, 35.7 mm, Namibe, Angola (CPR); 32, 33: shells, 40.2, 41.6 mm, Sacomar, Namibe, Angola (CPR).

Figuras 24-27. *Perrona micro*. 24: detalle de la espira; 25, 26: detalle de la protoconcha; 27: dientes de la rádula; 28: rádula. Figuras 29-33. *Perrona obesa*. 29: holotipo, 34,0 mm (BMNH); 30: concha, 31,2 mm, 10 m, Namibe, Angola (CER); 31: concha, 35,7 mm, Namibe, Angola (CPR); 32, 33: conchas, 40,2, 41,6 mm, Sacomar, Namibe, Angola (CPR).

lines which form an U-shape in the concave central portion; this is reversed on both the upper and lower protruding parts forming an overall S-shape on the whorl. There are about 6 whorls on the teleoconch, increasing gradually in width and height. The last whorl becomes elongated towards the base, the siphonal canal is widely open and almost similar in length to the lowest part of outer lip. The aperture is ovoid, with an U-shape sinus in the upper part, a sharp external lip, and a small callus on the columella. There are 20 spiral grooves from the periphery to the base. The colour is typically light brown or orangish, with white and dark blotches alternating on the subsutural cords, but in a few specimens the colour is darker and the white pattern is absent.

Soft parts: Study of a retracted specimen preserved in alcohol reveals a light coloured animal; the operculum (Fig. 19) is ovoid with the nucleus centrally placed on the interior. The radula (Fig. 28) is formed by two rows of about 70 elongate and sharply pointed marginal teeth (Fig. 27) at the center of which is a very small central tooth reduced to a cusp.

Dimensions: Holotype is 10.3 mm. The largest paratype is 12 mm.

Distribution: Only known from the type locality, where it is probably endemic.

Discussion: There is no known species from West Africa with which it can be confused. Only juvenile forms of *Clavatula quinteni* Nolf and Verstraeten, 2006, which are much larger when adult, are similar in profile and colouration; they both lack axial sculpture (see comparison in Figs. 20 and 21, 22 and 23) but *C. quinteni* has a much more elongated siphonal canal, a larger protoconch (more than double the diameter) and lacks spiral grooves.

There was some hesitation about the generic assignment of this new species. Comparison with morphologically similar species in some genera was made, in particular *Microdrillia* Casey, 1903; *Suavodrillia* Dall, 1918; *Parecuneus* Laserson, 1954, and *Maoritomella* Powell,

1942, *Tomopleura* Casey, 1904, and *Viriditurris* Powell, 1964. In all cases operculum and radula do not agree.

Perrona micro spec. nov., in spite of its small size, belongs to Clavatulidae. This is confirmed by the operculum with a medium-lateral nucleus and the wishbone-like marginal teeth with a vestigial rachidian one in the middle.

POWELL (1966) reviewed the Turridae (s. l.) and defined the subfamily Clavatulinae H. and A. Adams, 1858 with four recent and two fossil genera; the recent genera being *Clionella*, *Clavatula*, *Perrona* (with subgenus *Tomellana*) and *Pusionella*. KILBURN (1985), who dealt only with South African species, noted 4 genera; *Toxiclionella*, *Benthoclionella*, *Clavatula* and *Clionella*. TUCKER (2004) considers 492 fossil and 97 recent species in this group. Later BOUCHET AND ROCROI (2005) elevated Clavatulidae to family status.

The genus *Clavatula* Lamarck, 1801 is relatively abundant along the West Africa coast. POWELL (1966) mentions 11 species. Most of them, including the type species (*Clavatula coronata* Lamarck, 1801) are of large size. Other species recently illustrated and/or described, as detailed in our introduction, are also relatively large. Although BOYER AND RYALL (2006) noted that KNUDSEN (1952, 1956) classified other genera of *Clavatulidae* under the genus *Clavatula*, subsequent authors seem to ignore these genera and their paramaters as established by KILBURN (1985). A revision could conclude that some of them belong to other genera.

The genus *Clavatula* is described by POWELL (1966): "shell moderately large to large sized, 15 – 55 mm, very solid, buccinoid, coarsely axially and spirally sculptured; with a tall, often coronated spire, and a truncate body-whorl, terminated in a relatively short reflected and deeply notched anterior canal.... Operculum ovate-lunate with a medio-lateral nucleus. Radula consisting of a pair of stout narrowly pointed marginal teeth of modified wishbone type, the proximal extremity separate and superimposed upon the larger element. A small



Figures 34-37. *Perrona spirata*. 34-36: shell covered by organic material, 31.5 mm, Luanda, Angola (CPR); 37: operculum. Figures 38-41. *Perrona subspirata*. 38: shell, 31.5 mm; 39-41: shell, 32.0 mm, Namibe, Angola (CPR); 42: operculum.

Figuras 34-37. Perrona spirata. 34-36: concha recubierta por material orgánico, 31,5 mm, Luanda, Angola (CPR); 37: opérculo. Figuras 38-41. Perrona subspirata. 38: concha, 31,5 mm; 39-41: concha, 32,0 mm, Namibe, Angola (CPR); 42: opérculo.

but well formed unicuspid central tooth is present also." According to KILBURN (1985) the main features of *Clavatula* are: deep anal sinus, relatively long siphonal canal, distinct parietal tubercle and protoconch that is bluntly domed with about $2\frac{1}{2}$ whorls.

The species *P. micro* spec. nov. has some shell characters of *Clavatula* but has no axial sculpture and is smaller than all of them. *Clavatula cossignanii* Ardovalini, 2004, the smallest Clavatulidae known in West Africa, is different in most features including the fewer number of protoconch whorls and is endemic to Senegal. The holotype is 13.2 mm but it can reach a size of 15.9 mm (CPR).

According to POWELL (1966) the genus *Clionella* Gray, 1847 differs from *Pusionella* Lamarck, 1801 by its clavi-form shape with tall, flat-sided spire whorls; simple long flexuous axial ribs without either subsutural or peripheral processes and a truncated body-whorl. KILBURN (1985) defines *Clionella* with an anal sinus; a slight notch; siphonal canal short with no distinct parietal tubercle; protoconch somewhat conical, of about 2 whorls, the first one rounded and tilted. The genus is usually restricted to South Africa. *P. micro* spec. nov. lacks axial sculpture, its sinus is deep and does not have a truncated body-whorl: therefore it does not agree with *Clionella*.

The new species was also ruled out of the genus *Pusionella* Gray 1847 because many specific characters are absent in *P. micro*; the flat-sided whorls; the outer lip bordered by a broad, subsutural, very slight sinus and the smooth and polished surface.

Finally, the genus *Perrona* Schumacher, 1817 is described by POWELL (1966) as: "shell moderately large, 25 – 40 mm, rather narrowly fusiform, with a tall spire of rapidly increasing whorls

and a narrow body-whorl...surface smooth, or nearly so... with a conspicuous narrowly carinate subsutural collar...operculum as in *Clavatula*... radula with a pair of elongate marginals and a narrow-based unicuspid central tooth."

The known West African species of *Perrona*, all figured in the plates in the present work, are the following: *P. perron* (Gmelin, 1791) (Figs. 1-13), *P. spirata* (Lamarck, 1816) (Figs. 34-37), both already mentioned, *P. obesa* (Reeve, 1843) (Figs. 29-33) and *P. subspirata* (von Martens, 1903) (Figs. 38-41), both endemic to South Angola. Other authors have placed other species in this genus, for example *Perrona nifata* (Bruguière, 1789) by ABBOTT AND DANCE (1986), but this generic placement is erroneous in our opinion. POWELL (1966) also mentions another West African species belonging to this genus but placed in the subgenus *Tomellana* Wenz, 1843: *Perrona (Tomellana) lineata* Lamarck, 1816; but this shell has a short, concave-outlined spire and a deep slit-like anal sinus and does not resemble our species. STREBEL (1912) referred other species to *Tomellana*; they also do not correspond with the species currently reviewed.

Perrona micro spec. nov. is more similar to *Perrona perron* than to any other type species and the new species is placed in this genus as being the closest. Also noticed is a similarity in the colouration of the subsutural cord as well as the S-shaped axial striae. We find this at present the better solution rather than to create a new genus.

Whilst the similarity noted with *Clavatula quinteni* should not create confusion, a result of this paper must also be to assign this species to the genus *Perrona* although this has not been the reason for this work.

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BIBLIOGRAPHY

- ABBOTT, R. T. AND DANCE, S. P., 1982. *Compendium of Sea Shells*. E. P. Dutton, New York, ix + 411 pp.
- ARDOVINI, R., 2004. *Clavatula cossignanii* sp. n. (Gastropoda; Turridae) dal Senegal, West Africa. *Malacologia, Mostra Mondiale*, 43: 5-6.
- BERNARD, P. A., 1984. *Seashells of Gabon*. Pierre A. Bernard, Libreville, 140 pp.
- BOUCHET, P. AND ROCROI, J.-P., 2005. Classification and Nomenclator of Gastropod Families. *Malacologia*, 47(1-2): 1-397.
- BOYER, F. AND RYALL, P., 2006. Two new Clavatulinae species (Caenogastropoda: Turridae) from Ghana. *Iberus*, 24 (2): 33-38
- BRUGUIERE, J.-G., 1792. *Encyclopédie Méthodique ou par Ordre de Matière. Histoire Naturelle des Vers*. Vol. 1. Part 2. Panckouke, Paris, pp 345-757.
- CERNOHORSKY, W. O., 1974. Type specimens of Mollusca in the University Zoological Museum, Copenhagen. *Records of the Auckland Institute and Museum*, 11: 143-192, figs. 1-67.
- DAUTZENBERG, P., 1912. Mission Grüvel sur la côte occidentale d'Afrique (1909-1910). Mollusques marins. *Annales de l'Institut Océanographique de Monaco*, 5: 13-111, 3 pls.
- GMELIN, J. F., 1791. *Caroli a Linné Systema naturae per regna tria naturae, Editio decima tertia, aucta reformata*. Leipzig: G. E. Deer. Tome 1, pars 6 (Vermes): 3021-3910.
- KIENER, L. C., 1840. Genre Pleurotome. (*Pleurotoma*, Lam.) *Spécies général Muséum d'Histoire naturelle de Paris, collection Lamarck, celle du Prince Masséna et les découverts récente des voyageurs*. Paris: Rousseau. 84 pp, 27 pls.
- KILBURN, R. N., 1985. Turridae (Mollusca: Gastropoda) of southern Africa and Mozambique. Part 2. Subfamily Clavatulinae. *Annals of the Natal Museum*, 26 (2): 417-470.
- KNUDSEN, R. N., 1952. Marine Prosobranchs of Tropical West Africa collected by the "Atlantidae" Expedition 1945-46. Part 1. *Videnskabelige Meddelelser fra Dansk naturhistorisk Forening I Kjobenhavn*, Bd. 114: 129-185, pl. 13.
- KNUDSEN, R. N., 1956. Marine Prosobranchs of Tropical West Africa (Stenoglossa). *Atlantide Report n° 4*. Danish Science Press, Ltd. Copenhagen, 1956 pp. 93-105
- LAMARCK, J. B. P. A. DE, 1801. *Système des Animaux sans Vertèbres, ou tableau Général des Classes, des Orders et des Genres de ces Animaux.....* Lamarck and Deterville, Paris viii + 432 pp.
- LAMARCK, J. B. P. A. DE, 1816. *Liste des objets représentés dans les plances de cette livraison. Tableau encyclopédique et Méthodique des Trois Règnes de la Nature. Mollusques et Polytypes Divers*. Veuve Agasse, Paris. 16 pp, pls. 391-488.
- LAMARCK, J. B. P. A. DE, 1822. *Histoire Naturelle des Animaux sans Vertèbres...Précédée d'une Introduction Offrant la Détermination des Caractères Essentiels de l'Animal, sa Distinction du Végétal et des Autres Corps Naturels, Enfin l'Exposition des Principes Fondamentaux de la Zoologie*. Vol. 7. Guiraudet, Paris. 711 pp.
- MALTZAN, H. F. VON, 1883. Beiträge zur Kenntnis der senegambischen Pleurotomiden. *Jahrbücher der Deutschen Malakozoologischen Gesellschaft*, 10: 115-135, pl. 3.
- MALTZAN, H. F. VON, 1884. Diagnosen neuer senegambischen Gastropoden. *Nachrichtsblatt der Deutschen Malakozoologischen Gessellschaft*, 16: 65-73.
- MARRAT, F. P., 1877. A list of West Africa shells, including new *Pleurotoma* and *Columbella*. *Quarterly Journal of Conchology*, 1: 237-244.
- MARTINI, F. H. W. AND CHEMNITZ, J. H., 1788. *Neues systematisches Conchylien-Cabinet*, vol. 10, 1-376, pls. 137-173.
- NOLF, F., 2006. *Clavatula nathaliae* (Mollusca: Gastropoda: Conoidea: Turridae) a new species from Gabon: an old mystery finally elucidated. *Neptunea*, 5 (3): 1-14.
- NOLF, F. AND VERSTRAETEN, J., 2006. Recognition of two new *Clavatula* species (Mollusca: Gastropoda: Conoidea: Turridae) in a complex group from Gabon and North Angola. *Neptunea*, 5 (3): 15-29.
- NORDSIECK, F., 1968. *Die europäischen Meeres Gehäuseschnecken (Prosobranchia) vom Eismeer bis Kapverden und Mittelmeer*. Gustav Fischer, Stuttgart 273 pp.
- PETIT DE LA SAUSSAYE, S., 1851. Notice sur un groupe de coquilles classées parmi les Fuseaux (*Fusus* Lam.) avec la description de plusieurs espèces. *Journal de Conchyliologie*, 2: 73-79, 2 pls.
- POWELL, A. W. B., 1966. The molluscan families Speightiidae and Turridae an evaluation of the valid taxa, both Recent and fossil, with lists of characteristic species. *Bulletin of the Auckland Institute and Museum*, 5: 1-184.
- RECLUZ, C., 1851. Description de quelques coquilles nouvelles. *Journal de Conchyliologie*, 2 (2):194-216, pls. 5-6.

- REEVE, L. A., 1843-1946. Monograph of the Genus *Pleurotoma*. *Conchologia Iconica, or Illustrations of the shells of molluscous animals*. Reeve Brothers, London Vol. 1: pls. 1-40, species 1-155, + index and errata.
- SCHUMACHER, C. F., 1817. *Essai d'un Nouveau Systeme des habitations des vers testacés*. Copenhagen: Schultz. iv + 287 pp, 22 pls.
- STREBEL, H., 1912. Bemerkungen zu den *Clavatulula*-Gruppen *Perrona* und *Tomella*. *Jahrbuch der Hamburgischen Wissenschaftlichen Anstalten*, 29: 1-24, pl. 1.
- STREBEL, H., 1914. Mollusca I, Gen. *Pusionella*. In Michaelsen, W. (Ed.): *Beiträge zur Kenntnis der Meeresfauna Westafrikas*, vol. 1, Hamburg, pp. 87-125, pl. 3.
- SYKES, E. R., 1905. Descriptions of new forms of Marginellidae and Pleurotomidae. *Proceedings of the Malacological Society*, 6: 315-318, 1pl.
- TRYON, G. W., 1984. *Manual of Conchology. Vol. 4 Conidae, Pleurotomidae*. Philadelphia, Tryon. 151-413, 34 pls.
- TUCKER, J. K., 2004. Catalog of Recent and fossil turrids (Mollusca: Gastropoda). *Zootaxa*, 682: 1-1295.